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Original communication

Evidence based practice: Laboratory feedback informs forensic specimen collection in NSW

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ABSTRACT

The importance of having clear, evidence-based guidelines for the taking of forensic samples from suspects detained in police custody (persons of interest) and complainants of crime is essential for forensic practitioners. The need for such guidelines was seen as desirable in New South Wales (NSW) and a working group was set up comprising scientists, practitioners and police. Feedback from the laboratory regarding the results of the specimens taken by forensic practitioners throughout the State was received and analysed. This has resulted in changes to current practice and highlighted the need for further research in this area. It has also highlighted areas that have not changed in response to evidence A quality service demands transparency, process review, relevant research and feedback in order to progress. Examiners need to obtain the results for their cases in order to reinforce the value of the service they provide as well as to monitor and, where necessary, improve their forensic collection skills.

1. Introduction

The importance of having clear, evidence-based guidelines for the taking of forensic samples from suspects detained in police custody (persons of interest) and complainants of crime is essential for forensic practitioners.

The Association of Forensic Physicians (AFP) established an education and research sub-committee which has, since 1997, worked with forensic science providers and the police in the UK to provide up-to-date information for practitioners on the taking of the most commonly requested samples. The Faculty of Forensic and Legal Medicine (FFLM) took over this role in 2006 and established a Forensic Science Sub-Committee which meets twice a year and now publishes recommendations every six months, most recently July 2013.[16] The need for a similar working group to produce evidence based guidelines was seen as desirable in New South Wales (NSW).

2. Initial development of guidelines in NSW

In July 2011 the Clinical Forensic Medicine Unit (CFMU) of the NSW Police Force (NSWPF), along with the Forensic Services Group of NSWPF contacted NSW Health Division of Analytical Laboratories (DAL), now NSW Health Forensic and Analytical Scientific Service (FASS), to set up a working group to produce guidelines for practitioners working in the field of clinical forensic medicine.

The working group comprised scientists, with the relevant areas of expertise in forensic biology and toxicology; practitioners – forensic medical officers, working in general forensic medicine (including custodial care) and providing sexual assault services to both children and adults; and police representatives from the Forensic Services Group of NSW Police Force.

As a first step the working group reviewed the FFLM document. Guidelines were then drawn up based on the current practice as informed by the local practitioners and scientists along with review of evidence from the local and international literature. The guidelines were first published in August 2011 and are reviewed every six months and amended accordingly.

A single swabbing technique is recommended in NSW after local research demonstrated that the frequency of reportable DNA profiles observed when using single cotton swabs was equivalent or better when compared to the results obtained from double swabbing.[17,18] There are local challenges to the collection of forensic specimens within the State of NSW. The distances are vast (NSW 800 642 km^2 cf: UK 244 820 km^2) and, for example, there are no facilities for freezing samples. Time limits currently being used are given in Table 1.

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3. Audit of the results from the NSW forensic samples

In order to ensure that forensic samples are taken appropriately it is essential to have a history from the police, informant and/or counsellor to plan the forensic assessment. However it is also essential to check with the complainant/suspect the history of the incident and so modify the plan as required. Evidence-based forensic sampling should be based on the nature and timing of the act and the behaviour since the assault, e.g. whether the individual has washed.

The results from forensic specimen collection should also be used to improve practice. NSW forensic practitioners have been working with FASS to obtain the results from the specimens taken and receipt of the results from the biological samples from complainants (not toxicological at this stage) commenced in December 2010. There is a

Table 1
Time limits for the collection of forensic specimens.

Sample type	Reason for analysis
Mouth swab (1) Mouth rinse	Detection of semen if oral penetration within 24 h[1]
Skin swabs (1 swab per relevant area)	Detection of body fluids, cellular material, lubricant and other visible trace evidence, (e.g. soil). Limited data on persistence. Obtain if incident, with skin on skin contact (epithelial cells), has occurred within the preceding 12 h and the examinee has not washed. Up to 2 days if saliva, blood or semen suspected. However, if the subject has not bathed or showered then sample the relevant area of skin up to 7 days (inclusive) post incident.[2,3]
External labial	Detection of body fluids if: • Digital penetration within 12 h and examinee has not washed; • Cunnilingus up to 24 h.
Vulval swabs (1)	***First female genital sample*** Detection of body fluids if: • Vaginal intercourse (obtain even if condom purported to have been used) within 5 days or; • Digital penetration within 12 h and examinee has not washed or; • Cunnilingus up to 24 h • Ejaculation onto vulva/perineum.
Low vaginal swabs (1)	***Second female genital sample*** Detection of body fluids if: • Vaginal intercourse (obtain even if condom purported to have been used) within 5 days[4] (2 days if patient is pre-pubertal and it is possible to pass a swab).
High vaginal swabs (1)	***Third female genital sample*** Detection of body fluids if: • Vaginal intercourse (obtain even if condom purported to have been used) within 5 days (2 days if patient is pre-pubertal and it is possible to pass a swab).
Endocervical swabs (1)	***Fourth female genital sample*** Detection of body fluids if endocervix is visible and it is possible to pass a swab and; • Vaginal intercourse (obtain even if condom purported to have been used) within 5 days[5]
Perianal swabs (1)	***Final female genital sample (post-pubertal only)*** Detection of body fluids if: • Anal intercourse (obtain even if condom purported to have been used) within 2 days or; • Digital anal penetration within 12 h (if patient has not defaecated since the assault).
Anal canal (1)	***First anal sample*** Detection of body fluids if: • Anal intercourse (obtain even if condom purported to have been used) within 2 days or; • Digital anal penetration within 12 h (if patient has not defaecated since the assault).[6–8]
Rectal swabs (1)	***Second anal sample*** Detection of body fluids if: • Anal intercourse (obtain even if condom purported to have been used) within 2 days.
	Third anal sample In a female alleging anal intercourse alone, please seek consent to take vaginal samples in addition to anal swabs
Slides[9] Penile swabs Shaft and external foreskin (if present) (1) Coronal sulcus and internal foreskin (1) Glans (1)	Slide to be prepared only where sperm may be considered to be present. Detection of body fluids if intercourse within 3 days
Fingernails (10 swabs)	Recovery of trace evidence within 48 h[10–13] (e.g. body fluid, possible fibres) if offender unknown or not in an intimate relationship with complainant, or connection with fingernail broken at scene (if the circumstances suggest this as a possibility).
Toxicology[14,15]	
Blood preserved	Should always be taken if incident occurred within 48 h.
Urine	Should always be taken if incident occurred within 48 h, and up to 5 days in suspected drug-facilitated crimes.

form within the Sexual Assault Investigation Kit (SAIK) to provide the scientist with the relevant information to appropriately process the samples taken by the forensic practitioners. The results from these cases were reviewed for feedback to individual practitioners. Review of procedures is essential for quality assurance purposes. If the cut-off time is too short evidence will not be obtained and if the cut-off time is too long there is the risk that valuable resources, especially time and money, may be lost. Expensive forensic practitioners may attend to take samples that are not of proven value.

4. Methodology

FASS completed a feedback form (see Appendix) for every SAIK received and analysed commenting on the type of sample, the results from the analysis, as well as feedback regarding any deviation from recommended procedure and legibility of paperwork received. All completed forms were sent to the CFMU of NSW Police and then to a forensic examiner, who worked for both NSW Police and Health services, for distribution to the examiners who collected the specimens. Results were tabled in a spread sheet and analysed for purposes of this paper.

5. Results

Over the period 15/12/2010–15/08/2013 (32 months) 1226 sexual assault (adult and child) complainant results were returned to examiners.

In relation to gender 1142 (93.1%) were female; 82 were male (6.7%); 1 case was considered indeterminate; 1 gender was not recorded (or could not be assumed). Ages ranged from less than 12 months to 90 years. Time taken from incident to examination was recorded in time blocks (Table 2).

40 patients were seen 96 or more hours since assault. This group had a total of 107 samples submitted (excluding reference samples), 15 were tested and 5 had a +ve DNA result recorded (Endocervical ($n = 1$); LVS ($n = 2$); HVS ($n = 1$) and Vulval ($n = 1$)). Despite examiners recording post assault activity, this information was not available on results returned from the laboratory.

5.1. Transport to the laboratory

The time taken for the samples to be transported to the laboratory varied with 219 (17.9%) arriving within three days (as required by the current NSWPF Standard Operational Procedures) and 308 (25.1%) taking 60 or more days.

5.2. Protocol issues

In the laboratory feedback form there is an option to identify whether or not the protocol was completed correctly. In this context, the protocol is taken to include samples and paperwork.

449 kits (36.6%) were identified as having some problem with either the paperwork or the sample collection. Of the problems identified, 109 were observed to not have collected all the recommended samples. 56 had missing information and/or incorrect information recorded e.g. date and time of examination and assault, time of last intercourse. 102 did not have an accompanying reference (buccal) swab.

159 cases identified an issue with the slide collection (e.g. slide taken when not needed, slide not taken when needed or smear too large making microscopic analysis more difficult). In NSW, the laboratory requires an examiner to prepare a slide in all cases where a swab is collected looking for potential sperm. In many other jurisdictions the laboratory will prepare their own slide upon receipt of swab samples. The rationale given for having an examiner do this at the time of examination is that the laboratory staff can then proffer an opinion in court as to the immediacy of sexual intercourse.

In this analysis slides, where 50% or more of sperm were intact (67 samples), were only observed on samples taken within 48 h of assault (except for two cases where it had been noted there had been no consensual intercourse in the previous 7 days and one where there had been consensual intercourse in previous 7 days, actual time not noted).

Handwriting was considered illegible in 178 (14.5%) cases.

5.3. Screening tests

Sperm concentration was marked as "+" or more ("++", "+++", "++++") in 444 samples. 336 of these had a DNA result recorded of which 280 (83.3%) were positive. When the result was "++" (114 tested; 104 +ve), "+++" (58 tested; 51 +ve) or "++++" (23 tested; 21 +ve) this increased to between 87.9% and 91.3% correlation with a positive DNA result.

In biological samples (i.e. other than underpants, sanitary products, clothing etc.), AP levels of "+++" were noted in 15 samples and levels of "++++" were observed in 6. All samples were collected within 48 h of assault. 10 of these were tested for DNA resulting in 5 +ve results, all collected within 24 h of assault. Subsequent discussions with laboratory staff have identified the subjective approach to the rating system used for both AP and sperm concentrations i.e. a "+" rating by one examiner might equate to a "++" rating given by another examiner.

Research identifies that acid phosphatase (AP) sometimes remains detectable up to 3 days after sexual intercourse.[4] In this analysis there were 22 vaginal samples (Vulval, LVS, HVS or Endocervical) from 11 adult complainants that had a positive AP level after 96 h (no higher than "+"). In each case (except one where the field was not completed) consensual intercourse had occurred >7 days previously.

5.4. Staffing

Forty nine centres have been identified as sexual assault examination centres where the collection of forensic evidence is

Table 2
Time taken from incident to examination.

Time period	Number patients seen	Percentage of total patients seen	Number of DNA +ve results	Percentage of biological samples that were +ve for DNA (compared to total tested)
			For biological samples only ie vaginal (vulval, perineal, LVS, HVS, endocervical); anal (anal, rectal, perianal) and oral	
<6 h	264	21.5%	126	41.7% (126/302)
6 to 12 h	221	18%	112	45.2% (112/248)
12 to 24 h	349	28.5%	165	48.5% (165/340)
24 to 48 h	199	16.2%	78	48.2% (78/162)
48 to 96 h	109	8.9%	24	38.7% (24/62)
96 to 168 h	39	3.2%	5	38.5% (5/13)
>168 h (7 days)	1	0.08%	0	
Unknown	44	3.6%		

offered by either doctors or nurses. Of those, 8 have permanent staff working who have training in forensic medicine. Three of these are Child Protection Units (CPUs) dealing solely with children, two deal with both adults and children and three are predominantly adults only services. These units, collectively, had results for 687 patients returned (56% of all patients), of which 99 (8%) belonged to the CPUs. In this sample 286 children (aged 15 or less) had kits submitted for analysis. This means that the vast majority of children (65.4%), having forensic sampling conducted in NSW, are seen by doctors outside of the three major child protection units.

Services are not equally distributed as allocation and budgeting for staff relies directly with individual Local Health Districts, of which there are 16 in NSW with sexual assault examination responsibilities. Five of these LHDs provide permanent forensic staffing. Major satellite cities within 3 h drive of Sydney (e.g. Gosford, Newcastle John Hunter, Wollongong) do not.

277 different examiners were identified as having collected a SAIK. 136 (49.1%) had collected one kit only in the 32 months analysed. 225 (81.2%) had collected 5 or less. 11 (4%) had collected 25 or more.

5.5. Amylase

Of all samples sent in, 13 were tested for amylase of which 9 were positive. 8 were from skin (face, neck, penis and breast) and one was from underpants. All samples were collected within 24 h of assault.

5.6. Samples

6184 samples were submitted to the forensic laboratory for analysis, 5096 excluding blood or buccal samples (submitted for reference DNA). Results need to be analysed with the understanding that only one version of events is given to the examiner, in most cases, and that is an abbreviated version of events by the complainant. In a significant number of cases samples are collected from complainants who have no memory (or partial memory) of an assault. The adequacy of their memory was not recorded on the feedback sheets from the laboratory.

Feedback identifies whether a sample was positive for forensically significant DNA (from other than a consensual partner), was negative, was indeterminate, not tested or left blank. Rationale for no result recorded might vary from the sample was not tested because the case was closed, because a +ve result from a relevant area was already obtained (e.g. +HVS and therefore a decision not to test LVS); because screening tests were negative (AP −ve, sperm concentration "0") or for other reasons. As the rationale for no result could not be determined in our analysis, no comment has been made about these samples in most cases. The lack of ability to draw conclusions from this empty field ("DNA detected") has given impetus to suggested changes for examiner feedback in the future. It is proposed that this field requires a mandatory answer for every specimen that is received by the laboratory.

5.7. High vaginal

368 were tested (as evidenced by a lab response in the DNA result column of either Yes/No/Inconclusive). 280 of those tested were positive and these were collected within 48 h of assault ($n = 261$), 48–96 h of assault ($n = 12$), between 96 and 168 h ($n = 1$) and time unknown ($n = 6$) (See Table 3).

Table 3

High vaginal samples +ve for DNA detected	Time periods for collections			
	≤48 h	48 to 96 h	96 to 168 h	Unknown
$n = 280$	261 (93.2%)	12 (4.3%)	1 (0.4%)	6

5.8. Low vaginal Vs high vaginal

In 77 cases (where there was a positive or negative DNA result recorded for both LVS and HVS swabs), these results matched in 64 cases but differed in 13 (HVS + ve in 7 and LVS + ve in 6) (See Table 4).

5.9. Low vaginal Vs vulval

In 84 cases (where there was a positive or negative DNA result recorded for both LVS and Vulval swabs), these results matched in 71 cases but differed in 13.

This supports the argument for the continued collection of all 3 samples in cases of vaginal penile assault (Table 4).

5.10. Endocervical swabs

Until recently, protocol suggested that an endocervical swab only be collected when there was a history of penile vaginal assault ≥48 h prior to sample collection. 116 HVS samples were collected 48 h or later after assault. Only in 36 cases was an endocervical swab also taken.

5.11. Anal, perianal and rectal

105 anal and rectal samples were tested, of which 36 were positive for DNA and all were collected within 48 h of assault.

187 perianal samples were collected, 63 tested of which 19 were positive for DNA, all collected within 24 h after assault.

5.12. Oral

288 oral samples were collected, mainly swabs with only 17 rinses/saliva collections (not routine samples in NSW at time of writing). 70 were tested with a positive result in 4 (one of which was a saliva sample), all of which were collected within 12 h of assault. This is the least effective sample in terms of a positive DNA result.

5.13. Skin (excluding penis)

201 skin swabs had an accompanying slide. This should mean that the swab was collected for the purposes of finding sperm. Due to the inexperience of many examiners this is, unfortunately, not always the case. In this analysis, we only included samples ($n = 85$) where the laboratory demonstrated that they had looked for sperm (even if the result was negative) as the laboratory had the benefit of receiving a history. Of these, 22 returned a positive DNA result. There were no positive results after 24 h.

There were 403 skin samples submitted without a slide (or where the presence of a slide was not specifically recorded) and without a lab result for sperm microscopy. 98 were positive for DNA, all within 48 h of assault. These came from the arm, back, breast ($n = 47$), face ($n = 7$), lips ($n = 6$), neck ($n = 26$) and injury site swabs as well as from other areas of the genitalia not routinely sampled. From the results sheet it is impossible to determine whether the examiner was hoping to find DNA from epithelial cells or saliva.

Table 4

	Results for both matched (both either +ve or −ve)	Results for both differed (one +ve and other −ve)
LVS Vs HVS	64 (83%)	13 (17%)
LVS Vs vulval	71 (84.5%)	13 (15.5%)

5.14. Penile samples

42 samples were received from 30 complainants, 39 were tested and 9 produced a positive DNA profile. 8 of these positive samples were collected within 12 h of assault and one between 24 and 48 h. 21 of the 42 samples received came with an accompanying slide, indicating the purpose was to test for semen. The suggestion is, therefore, that examiners were unaware of when to produce an accompanying slide. The average number of penile swabs per complainant was 1.4. Guidelines in NSW recommend three swabs to be taken: coronal sulcus, glans and shaft.

5.15. Fingernails

71 fingernail samples were submitted from 37 complainants. 36 were tested and 9 samples from 3 complainants were positive, all collected within 12 h of assault. All were nail swabs and one was a nail scraping (not standard procedure in NSW). 12 fingernail clipping samples were provided from 8 complainants. Five were tested and none were positive for DNA.

5.16. Hair

72 hair samples were provided, 11 were tested and 1 was positive for DNA. 41 of these samples were from pubic combings of which 3 were tested and all negative.

7 hairs were collected from within the vaginal vault, 1 was tested and was negative for DNA.

We have no information as to whether or not the hair samples were ever offered for comparison analysis.

5.17. Sanitary products

42 sanitary products (pad, tampon, panty liner) were collected, 7 were tested and all were negative for DNA.

5.18. Pre-pubertal samples

Pubertal status was not recorded on the results sheet so, for this analysis, a female pre-pubertal sample was assumed when the child was aged 11or younger (with no corresponding HVS sample).

There were 191 samples taken (excluding reference DNA). 105 of these samples were tested and recorded either a positive, negative or indeterminate DNA result.

Fifteen positive sample results came from skin samples ($n = 5$), underpants ($n = 7$), vulval ($n = 1$), penis ($n = 1$), anal ($n = 1$). The vulval sample was collected within 6–12 h after assault, anal sample within 6 h and the skin samples (including penis) were all collected within 12 h.

Despite these findings and the findings from other pre-pubertal studies, protocols in NSW for paediatric collections remain at 48 h for vaginal samples. When the members of the joint working party differ in opinion, there is no clear delineation surrounding whose opinion is given greater weight or who has the ultimate deciding vote. The default position of leaving a time frame untouched is what usually occurs when differing views are encountered. In this case the differences might lie in the slightly differing ideologies between the two representative departments where one wants to ensure that every possibility is given to the collection of a sample which might provide evidence and one that wants to ensure that limited resources are not spent trying to obtain that which is rarely obtained.

5.19. Sexual assault nurse examiners

Nurses, based on this analysis, conducted 95 of all examinations where SAIKs were analysed (7.7%). The only permanently employed NSW SANE, co-working with medical forensic examiners, received results from 51 analysed kits during the time period of this analysis, making her the second busiest examiner in the state. Eleven other nurses received results (two from outside NSW) and collectively they received results from 44 patients.

6. Discussion

This project is, in effect, a clinical audit which is essential for all doctors to perform as part of continuing professional development and is a quality improvement process.

The procedure for collecting forensic evidence from a complainant in NSW is probably similar to most other centres around the world. A complainant is offered a forensic medical examination and may choose to undertake the examination, or parts thereof, or decline. This is independent of whether or not they decide to report the matter to police. Post exposure prophylaxis, emergency contraception and general medical assessment is offered to all, as required.

Sexual Assault Investigation Kits (SAIK) are individually numbered and available to all examination sites in NSW free of charge. Nothing in these kits (containing swabs, slides, paper bags etc.), nor the kits themselves, are treated with ethylene oxide to ensure the absence of DNA. The kit itself is delivered unsealed. The five swabs provided in the kit are supplied with a small corner cut off the sheath to allow circulation of air and prevent mould. This procedure has been adopted by the laboratory to combat the ongoing issues surrounding transportation of evidence for forensic analysis, especially as most units do not have the capacity to freeze samples.

Transport delays are generally not an issue if the investigating officer takes the kit at the time of examination. This, however, depends upon police being present, the patient having signed consent to release the kit to NSWPF (and not choosing one of the current NSW options of thinking about this for up to 3 months) as well as police having the time to wait for the additional 30–60 min that it takes to forensically seal specimens and complete paperwork.

Given the recent Australian issues with DNA contamination,[19] the current SAIK format/packaging is concerning and NSWPF are in the process of addressing these issues.

In an effort to reduce the contamination potential, contamination reduction kits have recently been provided, free, to all examination sites upon request. These kits are single use and sealed, pretreated with ethylene oxide and contain examiner gown, patient gown, bench cover and 6 sets of disposable gloves in two sizes. The outer wrap acts as a trolley cover and provides a clean surface upon which the SAIK swabs and slides can be placed. It is unknown, at present, how many of the 49 examination sites are using this kit and, if not, what other methods they have in place for the prevention of DNA contamination.

NSW is a vast state. It has a population of nearly 7.5 million (with more than half living in Sydney) spread over a land area in excess of 800 000 km^2. In an attempt to ensure equitable services to all, and in areas where sufficient doctors were not available, nurses were employed and trained to perform these services (from August 2005). Of the 27 initially trained only two were given permanent employment with the others working in an ad hoc basis. It is thought that only 8 of the 27 continue to work in forensic nursing.

The low number of cases being completed by most examiners (doctors and nurses) raises concerns about the quality of the examination and the court reports as well as the sustainability of services that are turning over forensic examiners regularly. This issue is unlikely to be resolved without clinical forensic medicine being recognised formally as a speciality. There is also a need for on-going mentoring, support and peer review for staff and the creation of services with permanent posts to ensure robust clinical governance procedures are in place.[20]

Obtaining the forensic results for examiners has come after a long consultative process. Reasons given for not returning results to examiners included the fact that it might alter an examiner's opinion in a case; the resources required to feedback the results were limited; and previous sporadic review of results (by the laboratory) had not revealed much in the way of new information. The laboratory has determined that the results do not belong to the examiner but, rather, to NSWPF who pays for the analysis. A compromise was reached in 2010 in which the laboratory agreed to forward all results to a single person within NSWPF and from there, all results were collated and individual results disseminated to examiners across the state.

The on-going analysis over the last 32 months has highlighted several issues which have informed the clinical practice of forensic practitioners and are currently being addressed. These include attempts to overcome the low oral rate by, firstly, the introduction of a complainant – collected early evidence kit (vaginal wipes, oral rinses and urine collection) and, secondly, by the introduction of oral rinses in addition to swabs.

Collection times have been reduced as a result of the findings. Cut off time periods for vaginal collections (penile vaginal assault) decreased from 7 days to 5 and oral collections decreased from 48 h to 24. This has a direct positive benefit for what are, currently, limited health resources. The analysis highlighted the fact that many examiners were simply forgetting to collect endocervical specimens when instructed to do so only if the assault occurred 48 or more after the assault. As a result, instructions to examiners have changed encouraging them to collect endocervical specimens whenever a speculum is used, in the hope this will increase the number of appropriate specimens collected.

It has become apparent that the lab is increasingly not conducting amylase testing on samples. This decision was made by scientific staff who make the preliminary decision concerning which samples should be tested. This decision had not been communicated to forensic examiners. Reasons cited for the discontinuation of this practice is that amylase is usually requested from swabs made for trace DNA e.g. skin swabs where there has been licking, biting, kissing etc. Testing of the swab for amylase decreases the amount of swab available for subsequent DNA testing. It is unknown whether this has legal implications especially where the offender knows the victim and a skin sample positive for DNA might not differentiate between touching and biting. Laboratory staff cited the fact that amylase can be transferred and that proving it was deposited by licking the skin directly might be difficult in court.

This analysis has further highlighted the need for on-going research in many areas. It also identified the inadequacies in some of the data supplied for examiners. While we believe that laboratory staff determinations of either incorrect or correct protocol completion may, in some instances be inaccurate, this is impossible to independently determine as no history, at the time of writing, is returned with the laboratory results. This is currently being addressed with the development of a new laboratory data base.

This analysis was a pre-cursor for review of SAIK transportation, with the introduction of courier transport replacing the need for individual officers having to drive to the laboratory to deliver specimens. It also prompted a review of NSWPF evidence rooms to identify the number of un-submitted SAIKs, with many of these being subsequently forwarded for analysis.

Problems with the handwriting legibility were identified in nearly 15% of all submitted kits. Given the importance for the scientist to have certain details in order to ensure that the correct samples are tested, NSW is in the process of changing the form submitted with the specimens. Much of the submitted information will be in the form of tick boxes (as well as the written history currently submitted) so that illegible forms are less problematic in future.

There appeared to be a significant number of problems, identified by laboratory staff, with slide collection. The inherent problems associated with requiring an examiner to do this at time of examination include the increased potential for contamination (having to write on slides and having to allow them to dry before packaging), the increased time required to prepare a slide, the confusion it causes for inexperienced examiners trying to remember when a slide is required and when it is not and the inconvenience when lab staff receive slides where the smear is too large for computerised microscopic analysis. On the other hand, it does not appear that assessing the number of complete sperm really adds discriminating value. Dziak et al.,[9] after literature review, determined that samples with no intact sperm may have been collected up to 7 days post intercourse. All vaginal samples in NSW are collected within 5 days and so the identification of no intact sperm really does not help determine time of intercourse. If intact sperm are seen, it has been proposed that intercourse is likely to have occurred within 72 h. This probably has little value when, as in NSW, the vast majority of complainants are examined within 48 h of alleged assault (84.2% in this sample).

Lastly, the most significant benefit has been that, for the first time, examiners are receiving direct commentary from laboratory staff regarding any issues with specimen collection and information provision. This fulfils a recent recommendation, to address the partial silo effect and the semi-invisibility of forensic physicians described by Kelty et al., of the benefit of multi-disciplinary interaction.[21]

The old saying, "*what doesn't get measured doesn't get done*", is no less true in the field of forensic medicine/nursing. A quality service demands transparency, process review, relevant research and feedback in order to progress.

Ethical approval

None declared.

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Conflicts of interest

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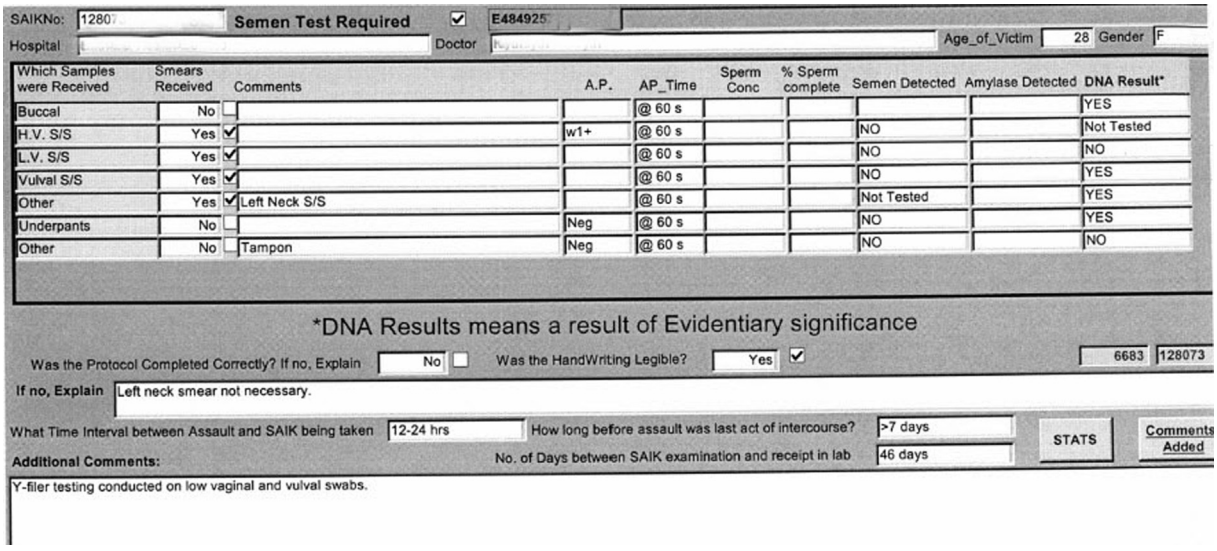
Appendix



SAIKNo: 1280 Semen Test Required E484925

Hospital Doctor Age_of_Victim 28 Gender F

Which Samples were Received	Smears Received	Comments	A.P.	AP_Time	Sperm Conc	% Sperm complete	Semen Detected	Amylase Detected	DNA Result*
Buccal	No			@ 60 s					YES
H.V. S/S	Yes		w1+	@ 60 s			NO		Not Tested
L.V. S/S	Yes			@ 60 s			NO		NO
Vulval S/S	Yes			@ 60 s			NO		YES
Other	Yes	Left Neck S/S		@ 60 s			Not Tested		YES
Underpants	No		Neg	@ 60 s			NO		YES
Other	No	Tampon	Neg	@ 60 s			NO		NO

*DNA Results means a result of Evidentiary significance

Was the Protocol Completed Correctly? If no, Explain No Was the HandWriting Legible? Yes 6683 128073

If no, Explain Left neck smear not necessary.

What Time Interval between Assault and SAIK being taken 12-24 hrs How long before assault was last act of intercourse? >7 days STATS Comments Added

Additional Comments: No. of Days between SAIK examination and receipt in lab 46 days

Y-filer testing conducted on low vaginal and vulval swabs.

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